

Quarterly Report
Covering October 1, 2005 to December 31, 2005
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Project Title

Warm Water Species Fish Passage in Eastern Montana Culverts

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Introduction

This progress report covers work completed between October 1, 2005 and December 31, 2005. Work on the project during this period has been primarily devoted to the evaluation of field data that was collected in 2005 and alterations to the experimental design based on that evaluation.

Project Objective

Culverts are a common and often the most cost effective means of providing transportation intersections with naturally occurring streams or rivers. Fish passage and fish habitat considerations are now typical components of the planning and design of waterway crossings. Many culverts in Montana span streams that support diverse fisheries. The health of these fisheries is an essential element of a recreational industry that draws hundreds of thousands of visitors to Montana annually. Additionally, there is growing recognition of the value of native Montana species, some of which are considered 'species of special concern' in the state. In recent years these concerns have become apparent for warm water species in low gradient, high sediment bearing, intermittently flowing streams that are typical of eastern Montana.

Transportation system planners, designers and managers recognize that fish passage through Montana's culverts is a concern. However, there is much contention concerning the impact that a culvert can have on a fishery. Recent basin-wide studies of various trout species that we conducted in western Montana indicate that the tools that some planners and designers promote for forecasting fish passage concerns may be overly conservative. Which species, life stages, and how many individuals must have fish passage access for how long, are questions that are often brought forward during discussions on the design and retrofitting of culverts to accommodate fish passage concerns. *The problem is that for warm water fish species and settings in eastern Montana, the timing and number of fish that must pass a culvert to maintain viable species diversity in the watershed is unknown, and the physiologic abilities of these species relative to such common fish passage questions are often unknown.*

Progress

Field data collected during the summer and fall of 2005 were evaluated to assess the appropriateness of the experimental design. This data included surveying, hydrologic and fisheries data. The fisheries data included preliminary fish mobility information at each site. At some sites fish population samples were collected upstream and downstream of the culvert in 300 m long reaches using in-stream seines. In each reach fish were measured and cataloged by species, sex and fork length. At other sites, the direct assessment of fish passage was measured by marking (or dyeing) and releasing fish downstream of a treatment reach (with the culvert) or a control reach (having no culvert), and then re-capturing fish at locations upstream of each reach. The recapture efficiencies overall were low due to the open-ended reaches (these streams tend to be too large to block with a net), but some fish of several species were observed passing the culverts and the control reaches none-the-less.

Preliminary analysis showed that the sheer number of fish species in these settings is an obstacle in itself. For example, 12 species were detected at Sand Creek, 20 species at Clear Creek and 13 species at Beaver Creek. Based on these initial results, the experimental design was modified to avoid marking species that are not captured in the initial sample with sufficient numbers to facilitate statistical comparisons. With this criteria in effect, each site would tend to have 4 to 6 species included in a mark-recapture scheme, rather than 12 to 20.

Early attempts at mark-recapture tests in this setting where electrofishing is not appropriate indicated the need for more field personnel to block fish movement out of treatment reaches. This is indicated by qualitative results from 2005, such as the following from three mark-recapture trials on Clear Creek:

- 6/5-6/8: Tagged 20 fish in the treatment reach and 9 fish in the control reach. Dyed 38 additional fish in the control reach. Recaptured 1 dyed fish upstream of the control, otherwise no recaptures.

- 6/21-6/24: Tagged 28 fish in the control reach and 67 fish in the treatment reach. Dyed 89 additional fish in the treatment reach. Recaptured no fish above the culvert (treatment), and recaptured one fish above the control. Only 5 tagged or dyed fish were recaptured overall.
- 8/8-8/11: Tagged 51 fish in the control reach and 95 fish in the treatment reach. Dyed 35 additional fish in the treatment reach. Recaptured 1 fish that swam through the treatment reach and 3 fish that failed to swim through the treatment reach (captured downstream of the culvert). Recaptured 3 fish that swam through the control reach and 2 that did not. Also recaptured 4 fish that had drifted down from the treatment reach into the control reach.

Results similar to these at other sites reinforced the need to rethink the experimental design for the 2006 season. This process continues.

Budget

Expenditures for this cycle are largely a result of stipends. The planned and actual expenditures were reset to equal each other on September 30, 2005 as a result of an approved project extension. The current project has been extended to June 30, 2007.

